A Woman's Heart

Utah Diabetes Telehealth Series, February 2012
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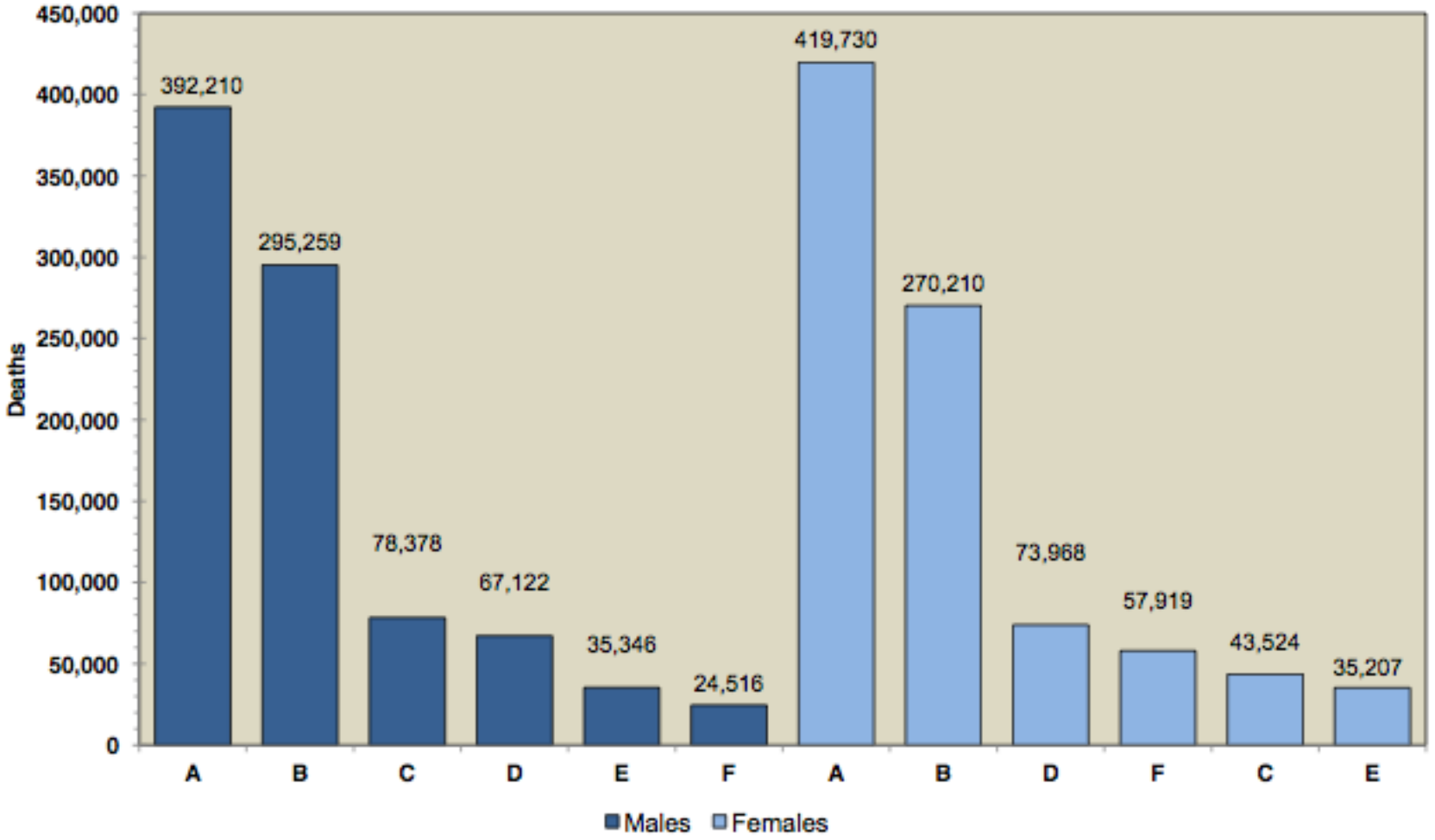
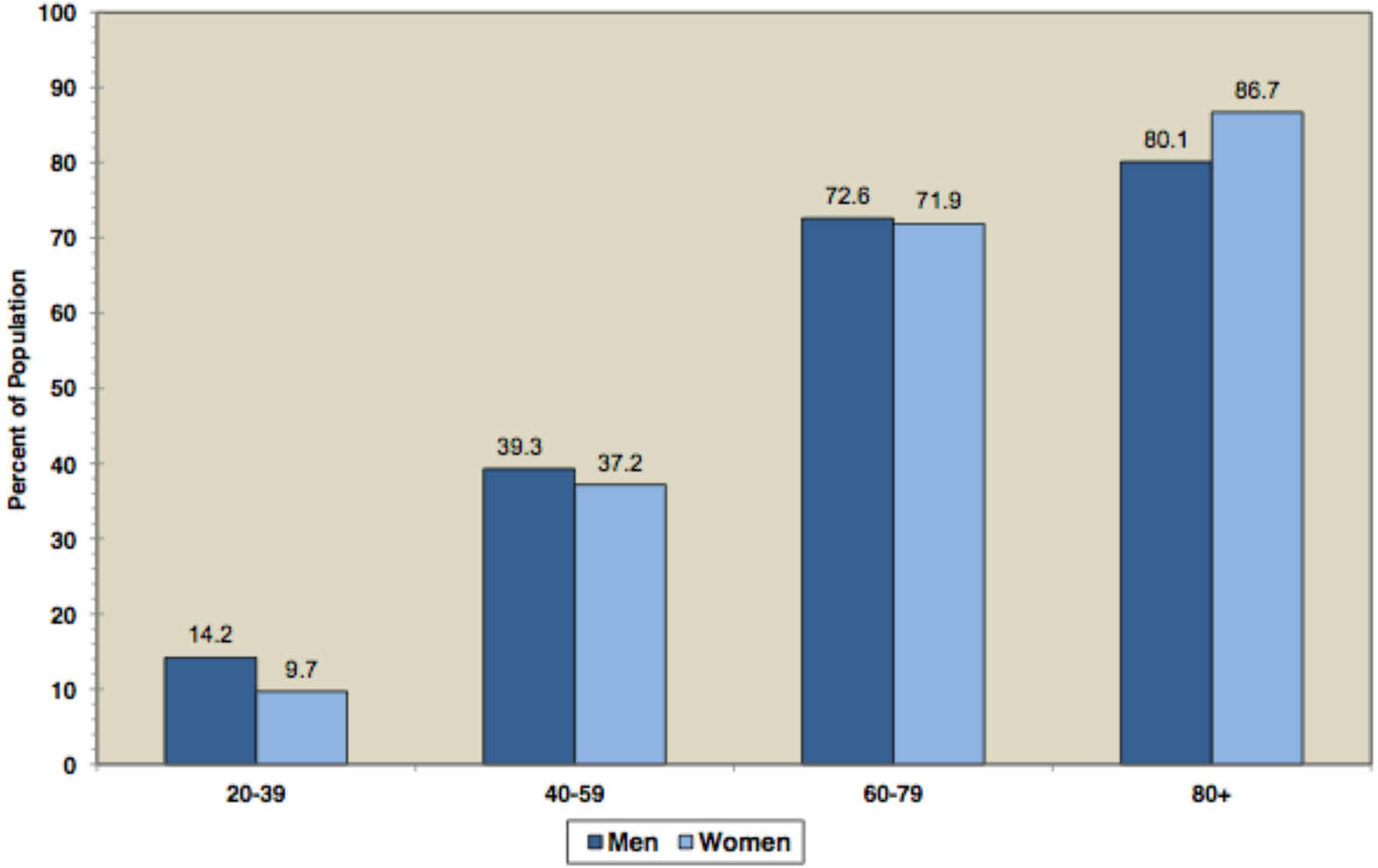
CVD and other major causes of death for all males and females (United States: 2008)



Source: NCHS and NHLBI. A indicates CVD plus congenital CVD; B, cancer; C, accidents; D, CLRD; E, diabetes; and F, Alzheimer's disease.

Roger VL et al. Published online in *Circulation* Dec. 15, 2011

Prevalence of CVD in adults ≥20 years of age by age and sex (NHANES: 2005–2008)



Source: NCHS and NHLBI. These data include CHD, HF, stroke, and hypertension.

Roger VL et al. Published online in *Circulation* Dec. 15, 2011

Impact of cardiovascular disease

- Mortality data for 2008 show that CVD accounted for 32.8% of all 2, 471, 984 deaths
- 1 of every 3 deaths
- >2200 Americans die of CVD each day
- **Average of heart attack every 25 seconds, a death every 39 seconds**
- 33% of deaths due to CVD occurred before the age of 75
- Lifetime risk of CVD at age 50:
  - >50% in men and 40% in women

AHA 2011 Heart Disease and Stroke Statistics

Imperfect individualized assessment of cardiovascular risk

Sir Winston Churchill, 91 ✝

- Overweight
- Not Fit
- Heavy Smoker

Karen Krantcke, 31✝♥

- Not overweight
- Very Fit
- Non-smoker

Why the surprise?

- **Because traditional risk factor based screening fails to predict 25% of deaths from cardiovascular disease**
- **Because people are unaware of the known risk factors they have**
- **Because people often do not control their modifiable risk factors**

Coronary heart disease

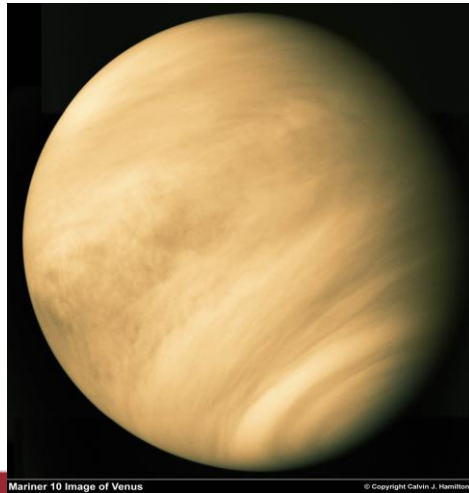
- Coronary heart disease caused 1 of every 6 deaths, a death every minute
- **In 30% of victims, the first symptom of underlying heart disease is sudden cardiac death**
- Approximately 200,000 heart attacks per year (in the USA), are considered silent
- African Americans and Hispanics are at greater risk for developing heart disease, but have lower rates of awareness that heart disease is the leading cause of death among women

Gender differences

No. 1 killer of American women

- **10-year delay in the onset of Cardiovascular disease in women**
- 1 in 3 women will have a heart attack or chest pains at some point in her life
- **Women aged 40 or older are more likely than men to die within one year of the heart attack**
- A woman in US suffers a heart attack every minute

- Less specific signs on the initial testing
- Smaller anatomy & different vascular biology
- Higher procedural complications rates



Factors contributing to CVD

- Common risk factors to both genders
  - Tobacco use
  - High cholesterol
  - DM
  - HTN
  - Inactivity
  - Obesity
  - Family Hx
  - Age
- Certain risk factors are greater for women than men
  - At ages <50, smoking is more deleterious in women than in men and increases risk of MI more.
  - Smoking rates in women are declining less than men
  - Age-adjusted prevalence of obesity is higher in women
  - Women are less physically active than men

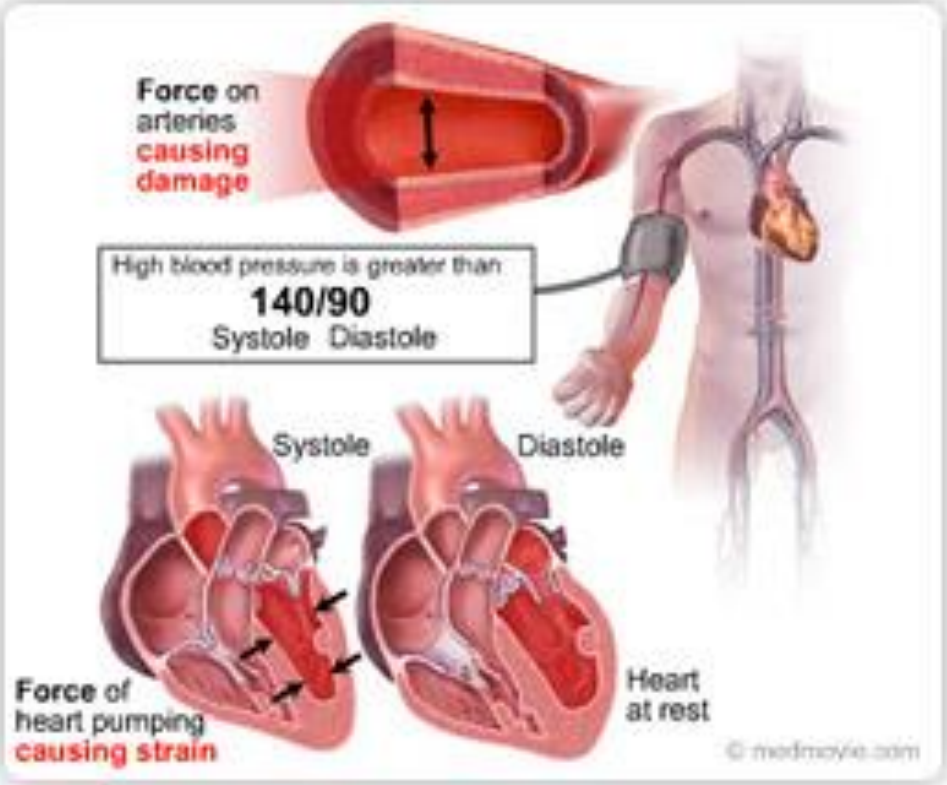
More data about risk factors from NHANES 2005-2008

- From 1998 to 2008, the rate of death attributable to cardiovascular disease declined 30.6%
- 33.5% of adults (≥ 20 y.o) have hypertension (African Americans have among the highest rates at 44%)
- Awareness and treatment of HTN was at 80% and 71%
- In 2010 26% smoke or only recently quit: 21.2% of men and 17.5% of women (≥ 18 y.o) continued to smoke
- IN 2008 15% adults ≥ 20 y.o had elevated serum cholesterol ≥ 240mg/dL, 63% aware
- 9% of the adults had Diabetes (African Americans, Mexican and Latino Americans bear a disproportionate burden within the US)
- 36.8% had abnormal fasting glucose levels
- 67.3% were overweight or obese (1 in 3 are obese)
- 33% report participating in no physical activity, 60% have intermediate-poor levels of physical activity based on accelerometer data

Certain risk factors are greater for women than men

- Differential effect of lipids
  - At younger age, the relative risk of hypercholesterolemia is lower in women
  - During menopause chol and LDL rise by 10-14%
  - The protective effect of HDL may be diminished with menopause
  - Low HDL & high triglyceride may be a better predictor of subsequent events than LDL
- Prevalence of obesity and diabetes is increasing in the women
  - Almost 2 of every 3 women over the age of 20 is overweight or obese
  - Body weight may increase during the first years since menopause and body fat distribution changes
  - Menopause down-regulates estrogen-dependent protective effects on vessel lining

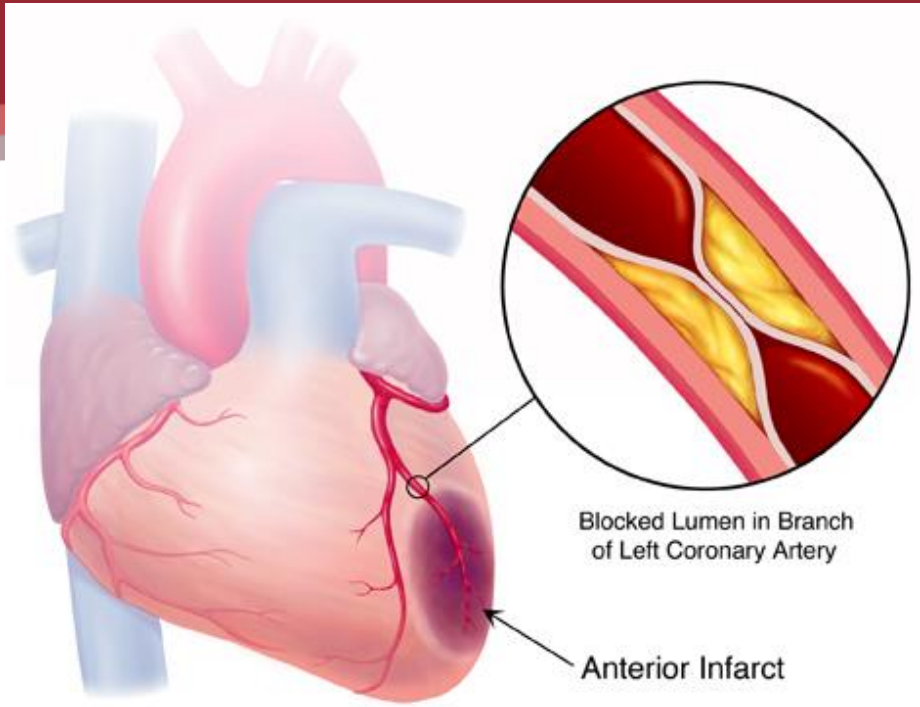
High Blood Pressure

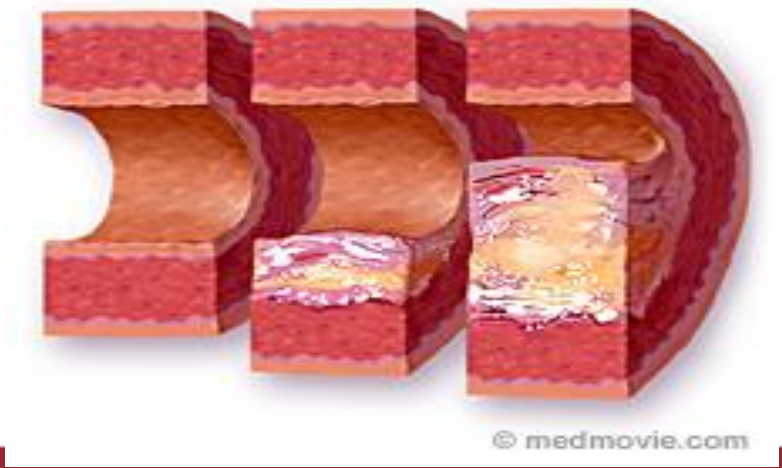


- Blood pressure= pressure of blood against the walls of arteries
- Elevated blood pressure is diagnosed from an average of seated blood pressure readings during 2 or more office visits
- Systolic: peak pressure
- Diastolic: minimum pressure
- Optimal < 120/80

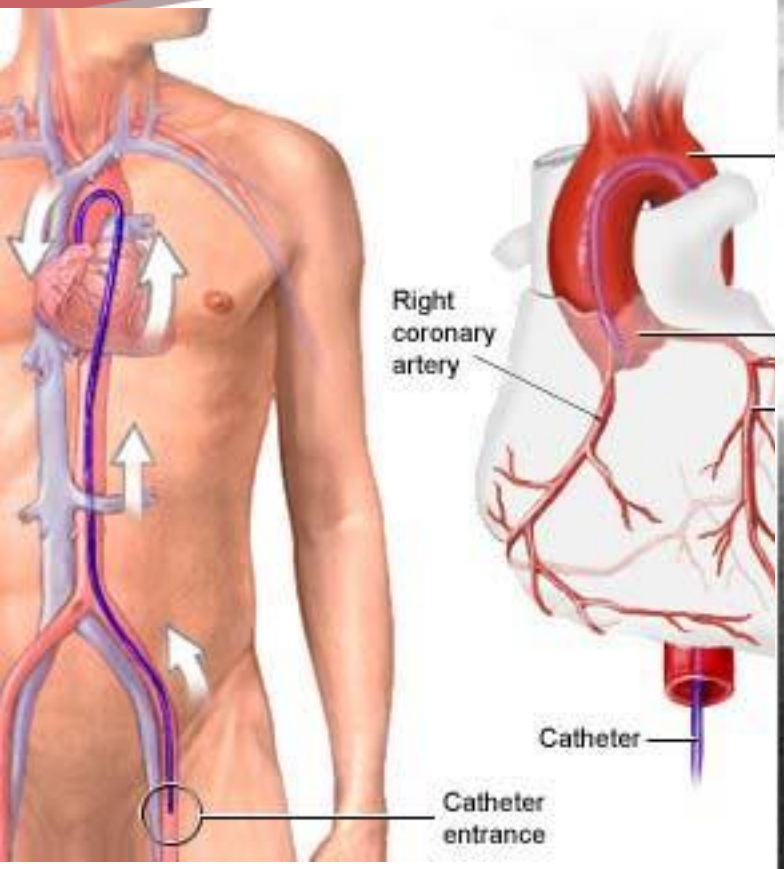
Cholesterol & coronary artery disease

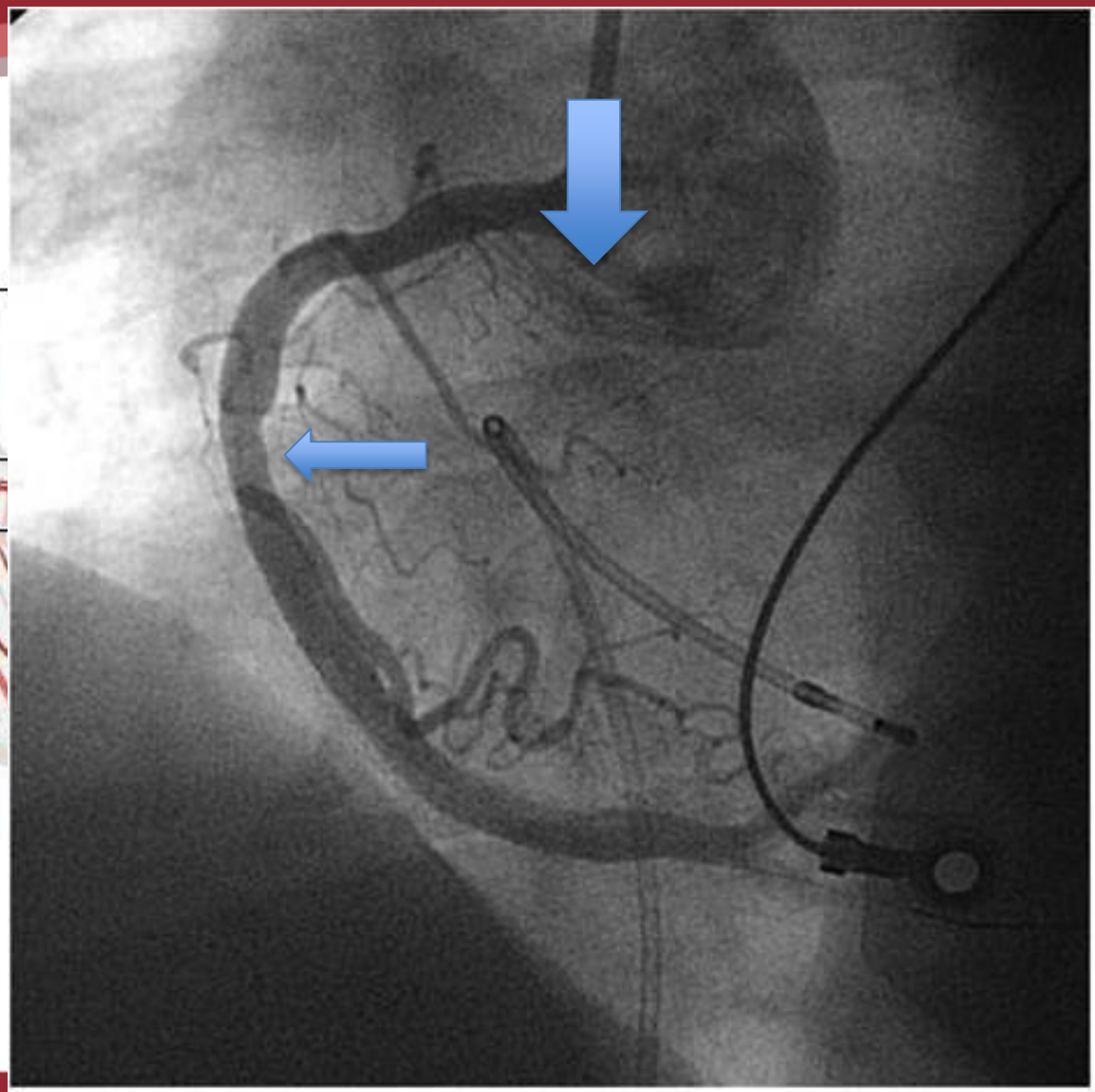
- CAD: Cholesterol plaque build up inside coronary arteries (atherosclerosis), supplying heart muscle with oxygen-rich blood
- Plaque: Fat, cholesterol, calcium, and other substances
- Cholesterol is affected by age, gender, menopause, genetics, & diet



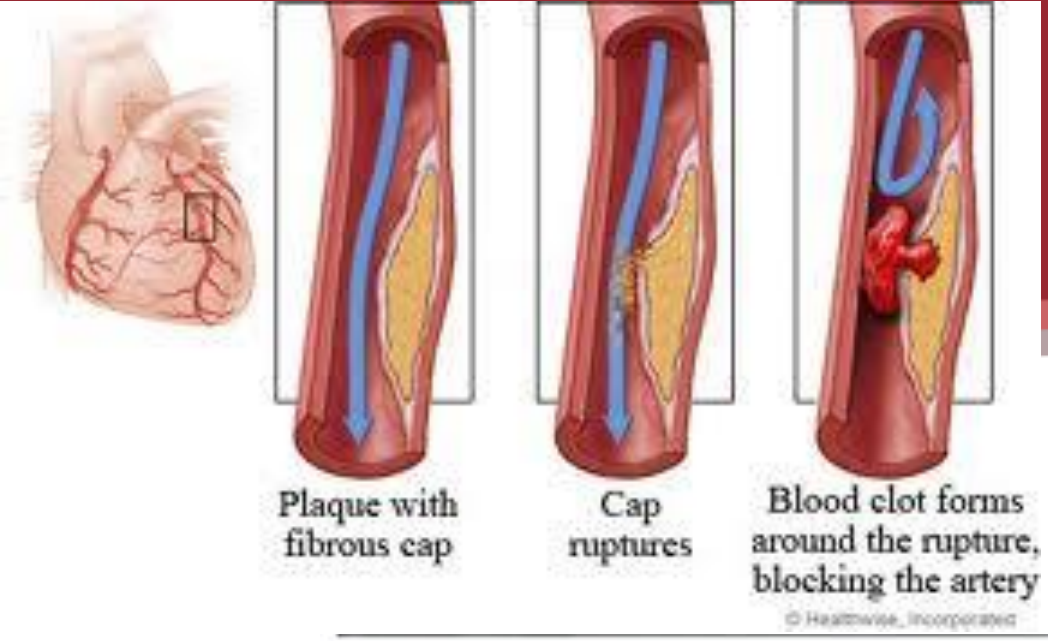


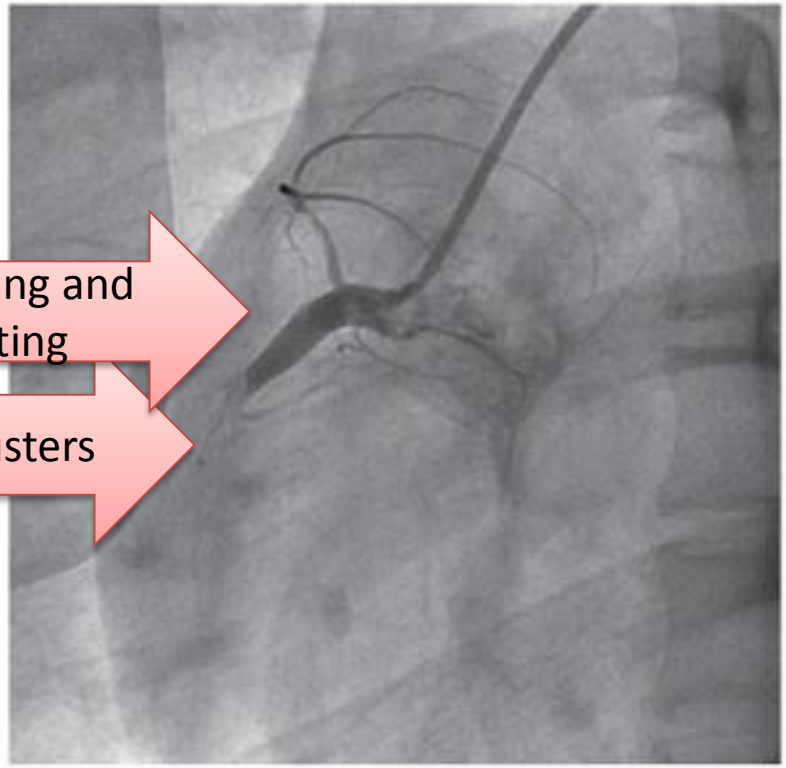
Coronary artery disease on angiogram





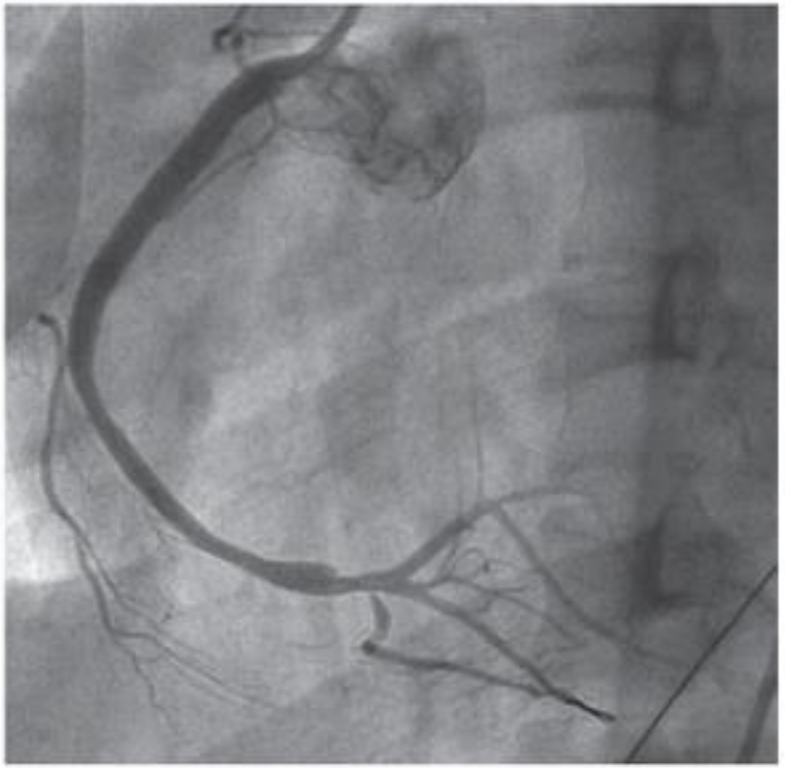
Mechanism of heart attacks





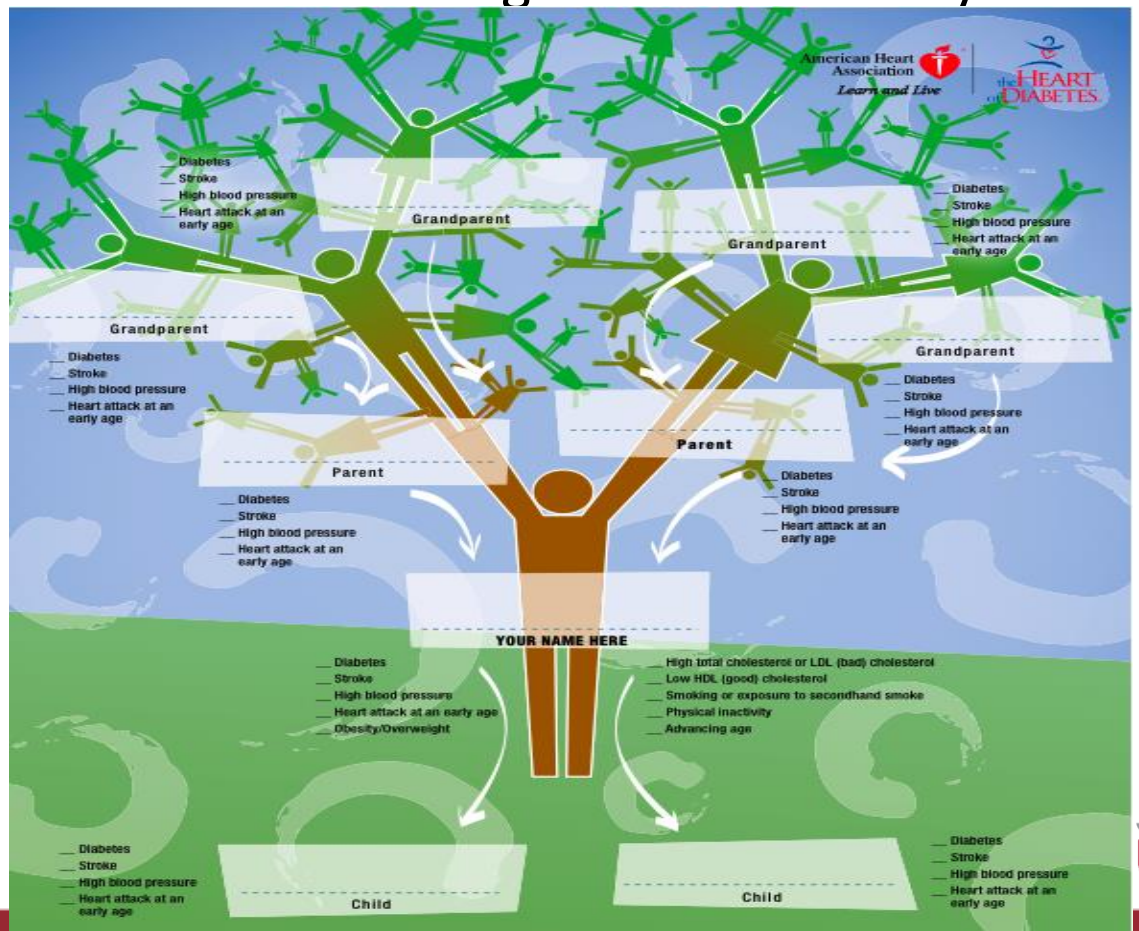
Ballooning and stenting

Clot busters



Your family history:

Male first degree relative <55 y.o
Female first degree relative <65 y.o



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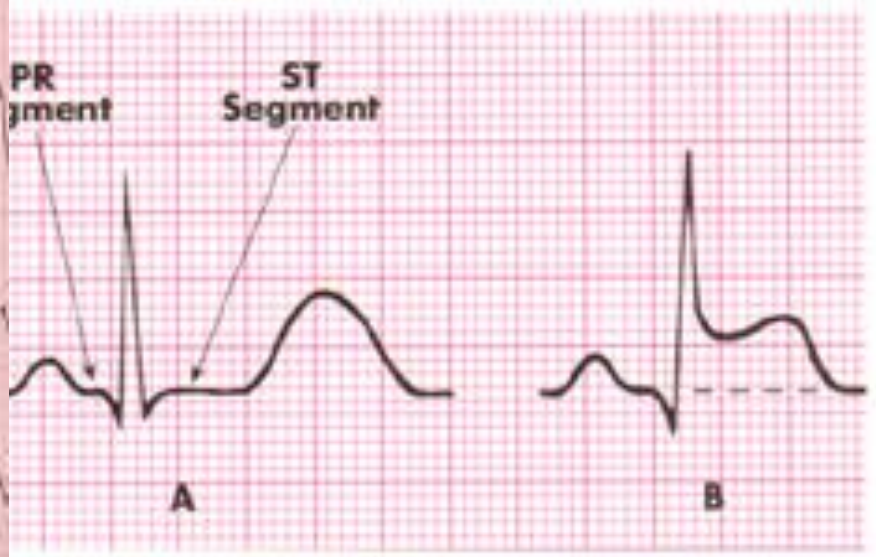
Difference in presentation

- More atypical symptoms
  - Nausea
  - Vomiting
  - Unusual Fatigue
  - SOB
  - Abnormal pain location (in the back)
- Only half of surveyed women recognized the typical symptoms of heart attack:
  - Chest pain or discomfort
  - Pressure or squeezing
  - Radiation to the arms, back, neck, jaw or epigastrium
  - SOB
- Only 53% of women would call 9-1-1 if they thought they were having a heart attack
- 79% said they'd call 9-1-1 if they someone else was having a heart attack
- Delayed presentation
- Other barriers
  - Expense
  - Education
  - Family/care-taking responsibilities
  - Confusion in the media

First line test for heart attacks: Electrocardiogram (ECG)

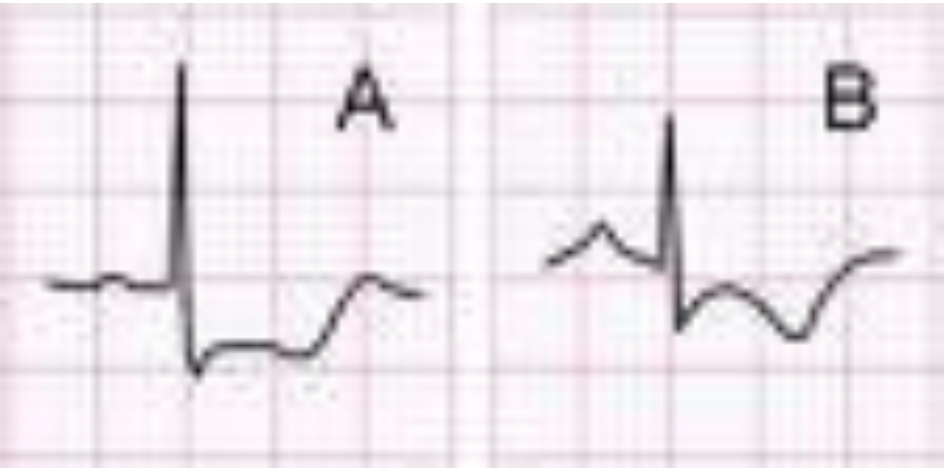
ST Segment Elevation

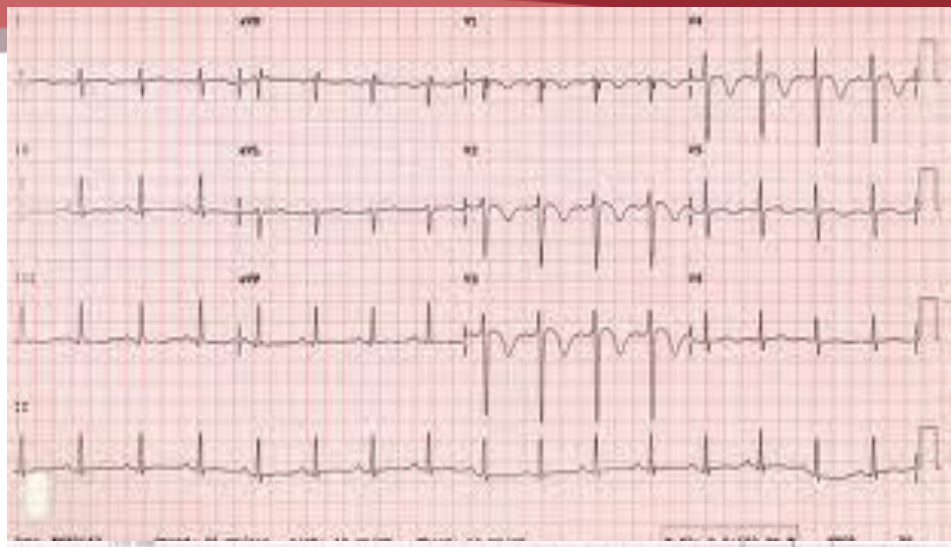


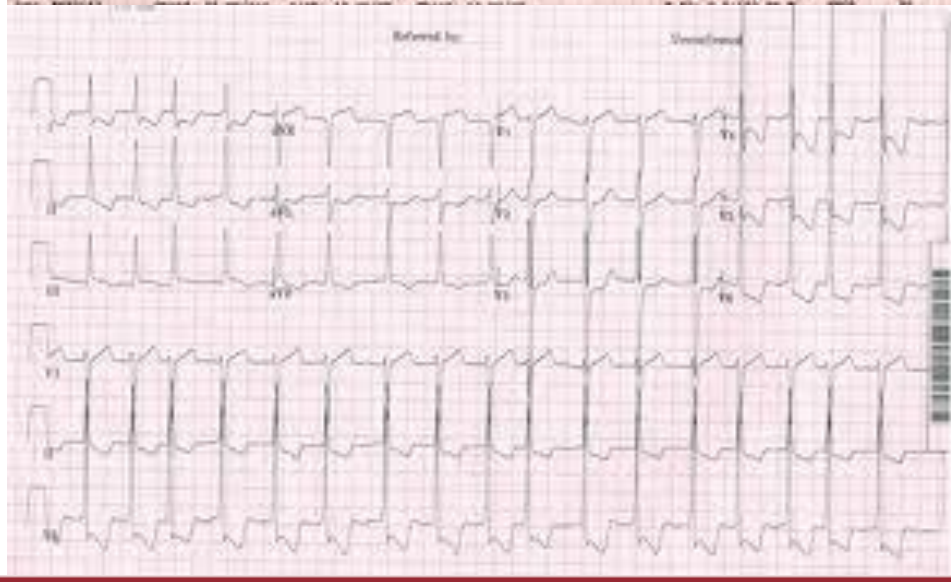
- ↑ 1 mm above baseline (limb)
- ↑ 2 mm above baseline (chest)
- .08 sec to right of J point
- Look for in two or more leads facing same area

ECG of NSTEMI

ST depression or T wave inversion

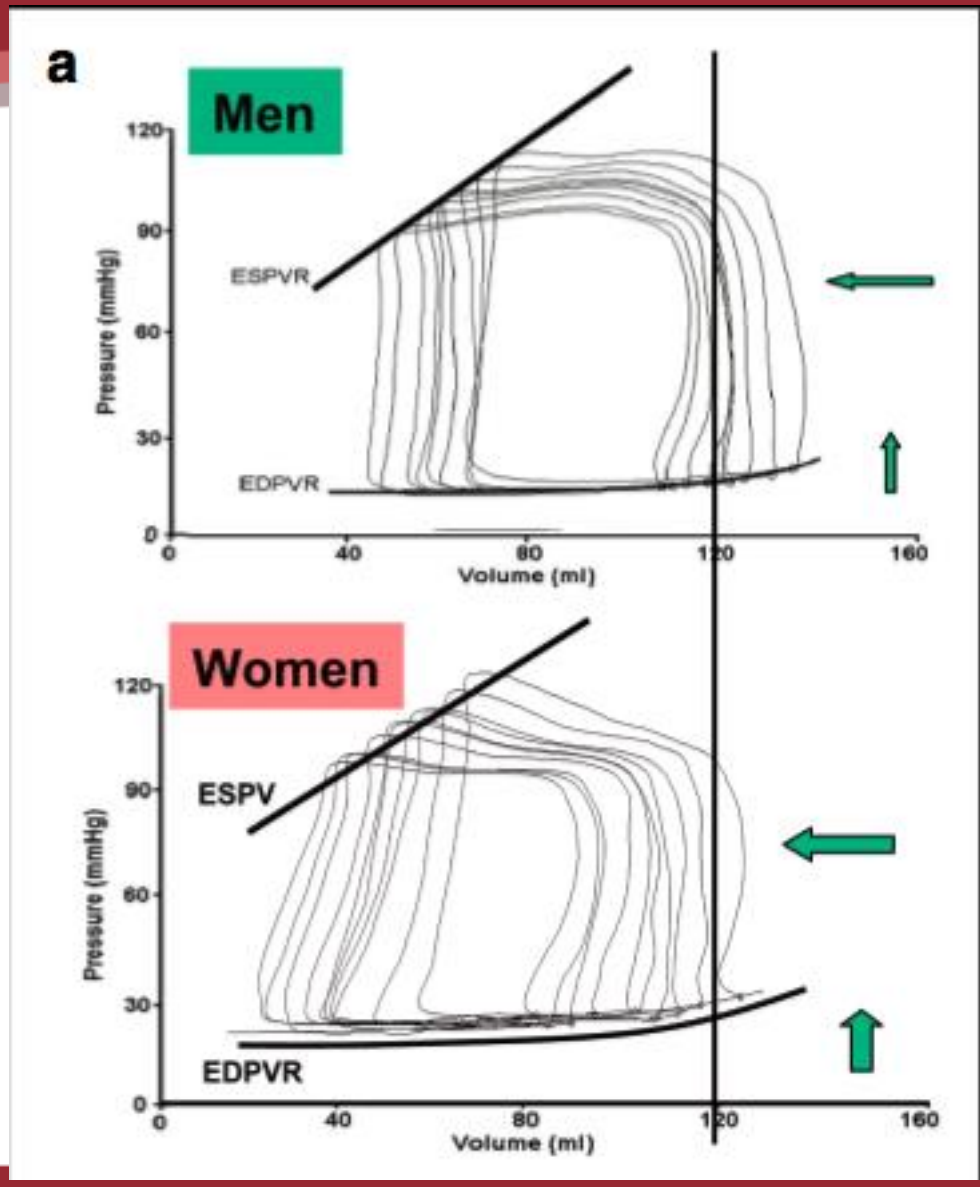






Structural Differences

- Women have a smaller caliber arteries
- Small ventricles
- Stiffer ventricles with higher wall tension
- Difference in myocardial response to loading: tend to develop concentric hypertrophy versus eccentric hypertrophy
- Different hormonal influences in vascular biology and clotting responses: pre and post-menopause

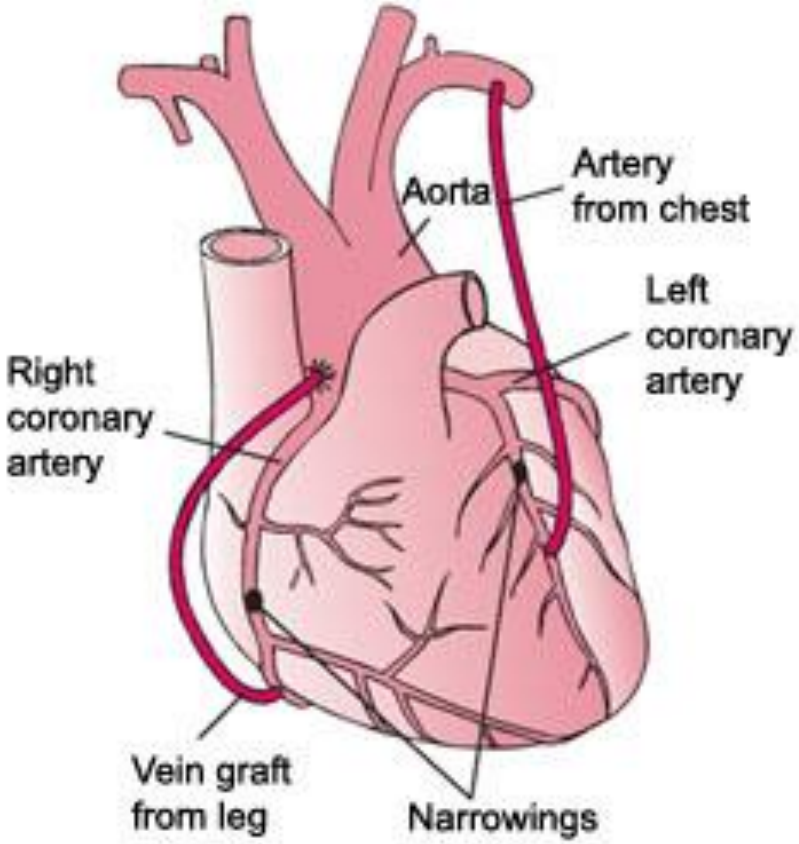


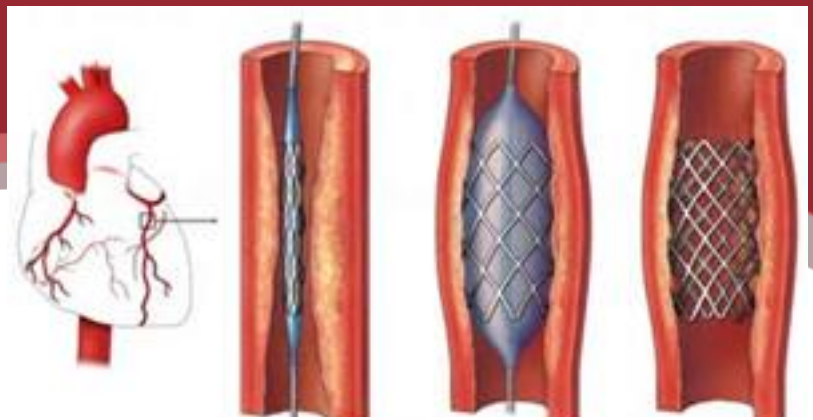
Difference in testing pattern and findings

- 60% of women undergoing invasive evaluation for chest pain or abnormal noninvasive tests do not have flow-limiting coronary stenoses
- Despite this, these women were chronically disabled and experience adverse cardiovascular events
- In ACS, women have less extensive obstructive and focal disease, but more diffuse disease

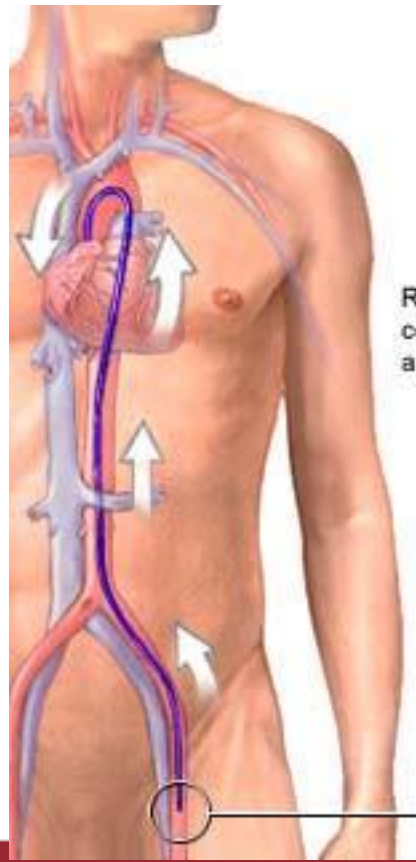
Difference in therapy

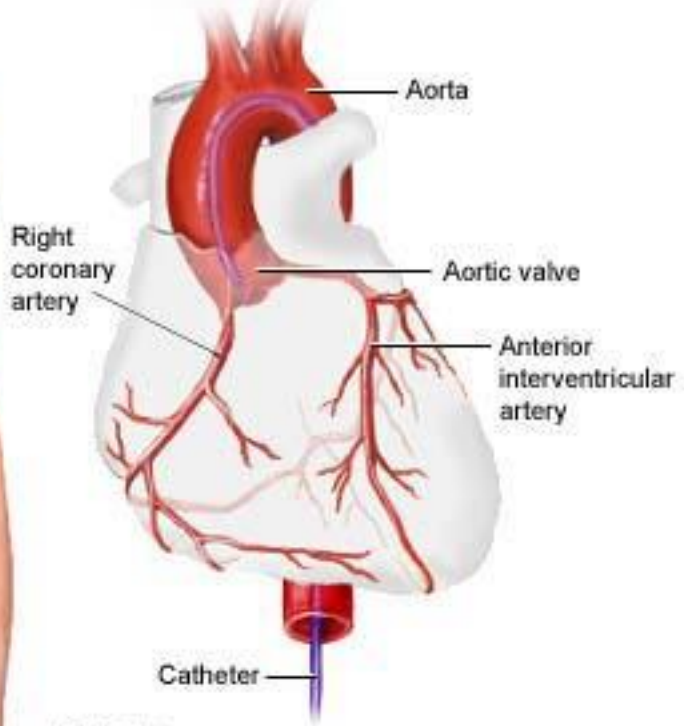
Surgical coronary artery bypass grafting





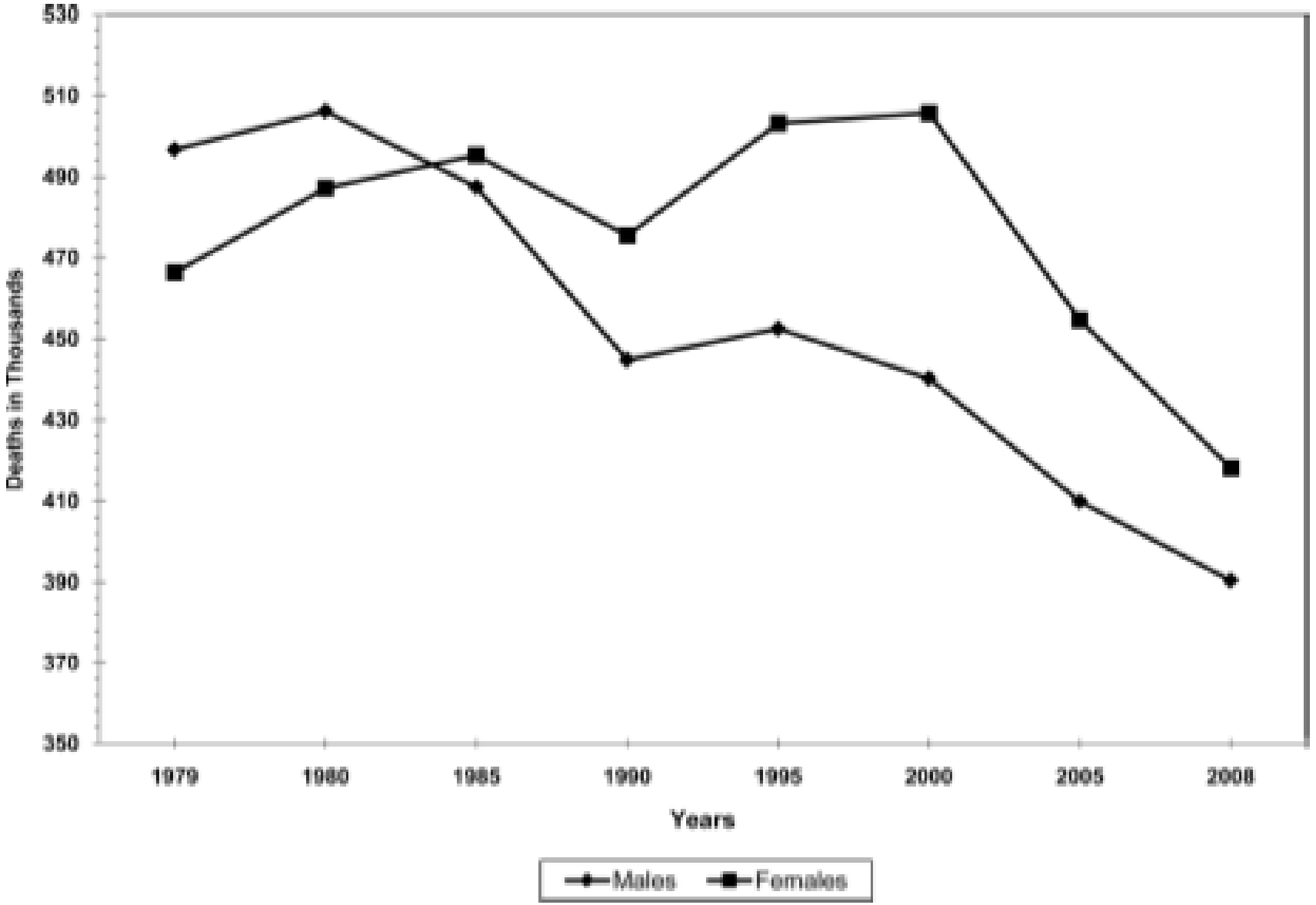
Percutaneous intervention





Cardiovascular disease mortality trends for males and females (US: 1979-2008)

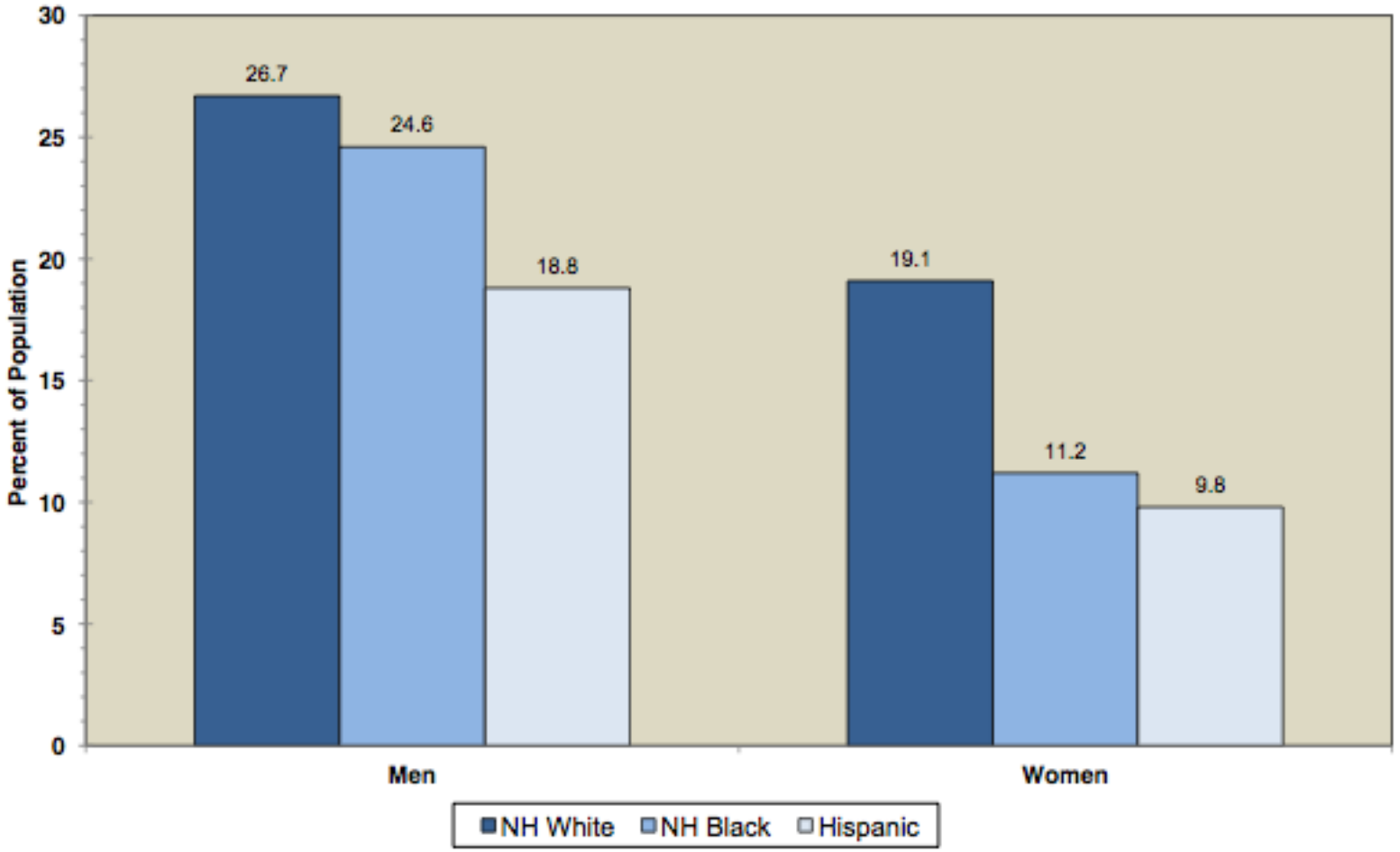
Source: National Center for Health Statistics. Circulation; 2012; 125: e2-e220



Prevention of heart attacks should be the primary goal. Treatment should be regarded as “locking the barn door after the horse is stolen”.

Eugene Braunwald, MD

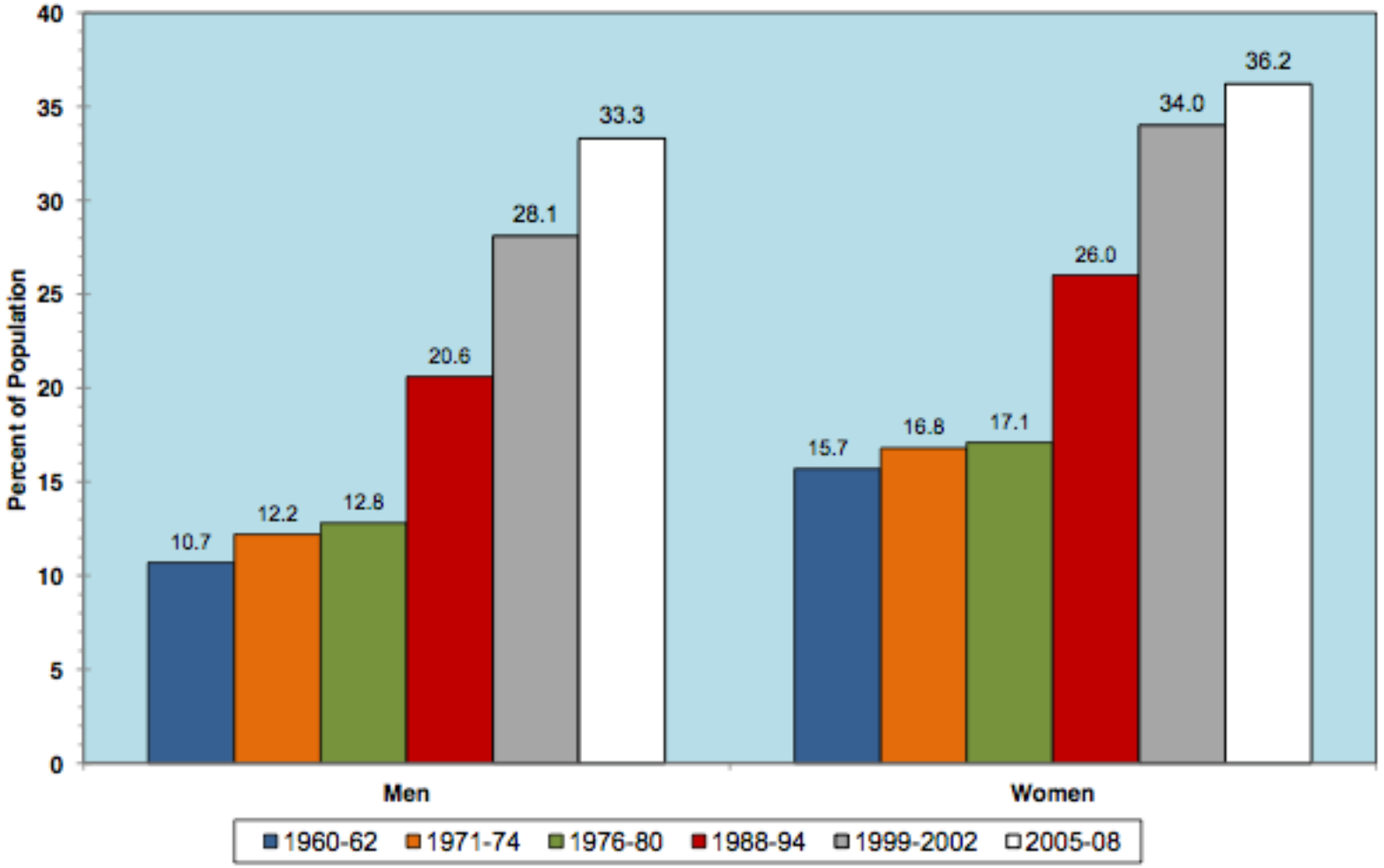
Prevalence of meeting the 2008 Federal Physical Activity Guidelines among adults ≥18 years of age by race/ethnicity and sex (NHIS: 2010)



NH indicates non-Hispanic. Percents are age-adjusted. Meeting the 2008 Federal PA Guidelines is defined as engaging in moderate leisure-time physical activity for at least 150 minutes per week or vigorous activity at last 75 minutes per week or an equivalent combination.

Roger VL et al. Published online in *Circulation* Dec. 15, 2011

Age-adjusted prevalence of obesity in adults 20–74 years of age, by sex and survey year (NHES: 1960–62; NHANES: 1971–74, 1976–80, 1988–94, 1999-2002 and 2005-08)



Data derived from *Health, United States, 2010: With Special Feature on Death and Dying*. NCHS, 2011.

Roger VL et al. Published online in *Circulation* Dec. 15, 2011

Why is education prevention?

- At least 70% of all deaths related to cardiovascular disease are due to modifiable risk factors
  - Overweight/obesity
  - Diet and nutrition
  - Elevated cholesterol and triglyceride levels
  - Degree of physical activity
  - Smoking
  - Alcohol consumption
  - Hypertension (high blood pressure)
  - Diabetes
  - Psychosocial stress levels

Research shows positive correlation between awareness & actions taken to reduce CVS risk

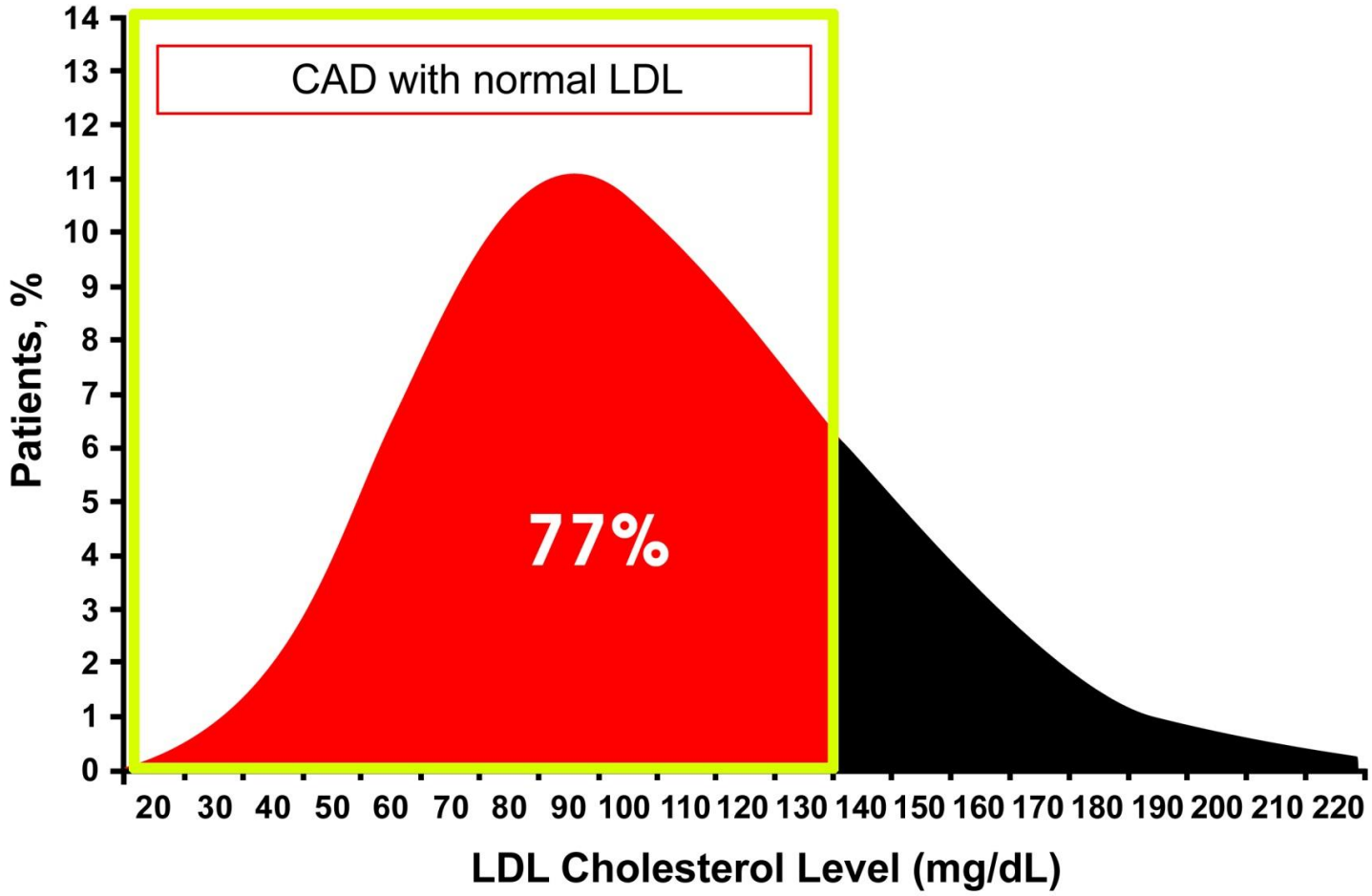
- Check ups: BP, BMI, Waist, & pulse Q2yearly regardless of age
- Check lipids Q5 yearly if normal from age 20 onwards
- > frequent lipid checks peri-menopause
- Know your goals:

Factor	Goal
Blood pressure	< 120/80 mmHg
Fasting Glucose	< 100 mg/dL
Body Mass Index	<25 kg/m2
Waist Circumference	< 35 inches

Knowing your patients' cholesterol

Factor	Goal
Total Cholesterol	< 200 mg/dL
LDL	<70 mg/dL in very high risk <100 mg/dL if high or >20% <130 if ≥ risk factors (10-20% risk)
HDL	≥ 40 in m ≥ 50 mg/dL in w
TG	<150 mg/dL

Of 136,905 patients hospitalized with CAD, 77% had normal LDL levels below 130 mg/dl



Modified from Sachdevaet al. AHJ, Vol 157, 111-117 Jan 2009

Chapter 1: Preventive Cardiology; the SHAPE of the Future in Naghavi et al. Asymptomatic Atherosclerosis: Pathophysiology, Detection and Treatment. Humana Press, 2009

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Screening for Atherosclerosis

Risk Factors vs Disease

Numerous Risk Factors

- High LDL
- Low HDL
- High BP
- Diabetes
- Smoking
- CRP
- Metabolic Syn
- Lp(a)
- Homocysteine
- Dense LDL
- Lp-PLA2
- ApoB/ApoA
- Family History
- Sedentary Life
- Obesity
- Stress
- ...
- ?

Over 200 risk factors have been reported.

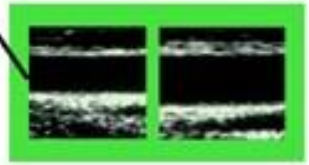
Carotid IMT and Plaque Measured by Ultrasound

Examples of Arterial Structure Tests

Aortic and Carotid Plaque Detected by MRI

Coronary Calcium Score Measured by CT

Ankle Brachial Index



Brachial Vasoreactivity Measured by Ultrasound

Vascular Compliance Measured by Radial Tonometry

Examples of Arterial Function Tests

Microvascular Reactivity Measured by Fingertip Tonometry

Table 5. CVD Points for Women

Points	Age, y	HDL	Total Cholesterol	SBP Not Treated	SBP Treated	Smoker	Diabetic
−3				<120			
−2		60+					
−1		50–59			<120		
0	30–34	45–49	<160	120–129		No	No
1		35–44	160–199	130–139			
2	35–39	<35		140–149	120–129		
3			200–239		130–139	Yes	
4	40–44		240–279	150–159			Yes
5	45–49		280+	160+	140–149		
6					150–159		
7	50–54				160+		
8	55–59						
9	60–64						
10	65–69						
11	70–74						
12	75+						
Points allotted							Total

SBP indicates systolic blood pressure.

Table 6. CVD Risk for Women

Points	Risk, %
≤−2	<1
−1	1.0
0	1.2
1	1.5
2	1.7
3	2.0
4	2.4
5	2.8
6	3.3
7	3.9
8	4.5
9	5.3
10	6.3
11	7.3
12	8.6
13	10.0
14	11.7
15	13.7
16	15.9
17	18.5
18	21.5
19	24.8
20	28.5
21+	>30

-The most commonly used risk score, Framingham risk score:
It is ONLY a 10 year risk assessment & is less gender specific, & does not account for:
-Ethnicity
-Inflammation
Family history of premature heart attacks
-Obesity
-Sedentary lifestyle
-Diet
-Psychosocial stress

Useful websites & contacts

http://www.goredforwomen.org/
1-800-AHA-USA1
http://www.mylifecheck.org/

University Healthcare
Care-Met Program (Cardio-metabolic Risk assessment & Reduction)
Call 801-581-7761 **for more information or email us at**
http://healthcare.utah.edu/cardiovascular

Women's Midlife Assessment Clinic
Call (801) 213-2995 for more information or email at
wmlac@hsc.utah.edu

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